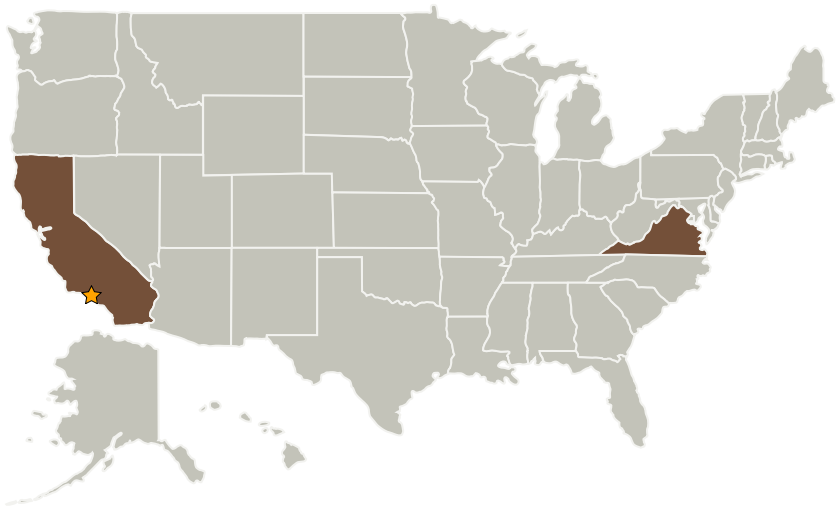
Precision Constellation Position Determination, Phase I

Completed Technology Project (2004 - 2004)

Project Introduction

For a distributed aperture sensor, especially at infrared and optical wavelengths, the relative position of the aperture components must be known and controlled precisely. When the aperture components are on separate independent spacecraft, determining the relative range and bearing is the challenge our proposed innovation addresses. The estimation of the relative range and bearing will be used in the positioning and control of remote sensors. Using a laser cross-link between the spacecraft, the fine positioning (25 cm) stage can be accomplished using the network protocols, message structure and by leveraging a balanced system of range and synchronization we have developed and employed on experimental and operational systems. For hyperfine position (1 micron) we propose to use the same cross-link since the laser wavelength is the same size as the requirement. Tuning is accomplished by setting up an interference pattern between the two satellite laser beams and adjusting the focal plane for the maximum intensity. To solve the phase ambiguity that will arise, we propose to further modulate the lasers with a pseudo-random noise code and integrate over several code chip intervals to resolve the ambiguity and reach the 1 micron requirement.

Primary U.S. Work Locations and Key Partners



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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Jet Propulsion Laboratory (JPL)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
★Jet Propulsion Laboratory(JPL)	Lead Organization	NASA Center	Pasadena, California
Avtec Systems, Inc.	Supporting Organization	Industry	Fairfax, Virginia

Primary U.S. Work Locations	
California	Virginia

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

Philip Moser

Technology Areas

Primary:

- TX08 Sensors and Instruments
  - TX08.2 Observatories
    - TX08.2.3 Distributed Aperture